**REMARKS**

Claims 25-41 are in the case.

Claim 25 has been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite product by process.

Claims 26-41 have been amended to more particularly point out and distinctly claim that which Applicants regards as their invention to delete the reference of a process in referring to the previous claims.

Claims 26-41 stand objected because of informalities in respect to reference to previous claims stating a process while the claims are directed to an aluminum product.

Claims 26-41 have been amended to recite product by process and to delete reference to a process in referring to the previous claims, and the objection to Claims 26-41 is believed to have been overcome by the amendments to the Claims. Accordingly, the objection is respectfully requested to be withdrawn.

Claims 25-41 stand rejected under 35 U.S.C. 103(a) as unpatentable over Moshier et al. U.S. Patent 4,917,964, (herein-after "Moshier").

The Examiner takes the position that Moshier discloses an aluminum matrix containing titanium carbides.

U.S. Patent No. 4,917,964 issued to Moshier discloses producing titanium carbide by induction heating a powder of titanium, carbon, and aluminum, i.e., in the form of a compact, to produce a concentrate of 60 wt.% titanium carbide in the form of a solid which is crushed. The Moshier actual examples, i.e., Examples 1-6 and 8, use boron and not carbon. The Moshier additives are added as a solid phase powder, not as a liquid phase.

Moshier teaches heating a powder of titanium, carbon, and aluminum which is contrary to Applicants' Claims which require liquid aluminum and liquid titanium.

Moshier teaches a titanium carbide in the form of a solid which is crushed, which is contrary to titanium carbide formed in situ as required in Applicants' Claims.

Moshier teaches preparation of a porous metal composite material, which is completely different from the high density product by process of Applicants' invention.

The Examiner admits that Moshier does not teach process limitations, mechanical properties, or an airframe.

The Examiner admits that the prior art differs in the manner by which it is produced.

Applicants have shown that the process steps associated with the claimed product by process result in a materially different product from that formed by Moshier.

The Examiner admits that the Moshier aluminum with titanium carbide particles does not teach the "mechanical properties and so forth" required by Applicants' invention as claimed.

Applicants object to the Examiner taking judicial notice to shape, size, or form, and a cited reference publication is required. Applicants object to the Examiner taking judicial notice that change of shape, size and form has been held an obvious variant in any art, and a cited reference publication is required.

Applicants' invention as claimed provides a novel aluminum product by process containing ceramic particle dispersoids formed in-situ in metal by liquid-state process. In one aspect, Applicants' invention as claimed provides a novel product by process for producing a material containing uniformly dispersed, finely sized ceramic phase titanium carbide particles, formed in-situ in metal to form a novel liquid-state dispersoid-forming product by process.

The present invention provides a novel liquid-state-in-situ-formed ceramic dispersoid in metal product produced by the

process of providing a molten composition of molten aluminum metal / alloy and molten Ti metal, wherein the Ti metal is provided in molten composition as a liquid and not as a powder.

Moshier teaches the use of powders.

The significant difference of liquid and not powder is important to bring the components of liquid titanium and carbon to reactive contact in the liquid state in the process of the present invention. A high density uniform dispersion of very small dispersoid particles is provided by the product formed by the process of the present invention.

Moshier teaches preparation of a porous metal composite material.

The product of the present invention as claimed is very dense, e.g., on the order of 98% to 99% or higher. Porosity is undesirable in the product of the present invention. The importance of the high density, essentially non-porous product by process produced in accordance with the present invention is found in providing a porosity-free material for producing aluminum castings.

In one aspect, the novel ceramic dispersoid in metal product by process produces such a ceramic dispersoid in metal forming unique uniformly dispersed and finely sized carbide particles of

the present invention formed in-situ in metal. In this one aspect, the present invention incorporates a novel mixing process involving the following two components:

(1) molten metal in combination with liquid titanium; and

(2) salt containing fine carbon particles or dissolved carbon or a combination of fine carbon particles and dissolved carbon.

It has been found that the product by process of the present invention provides a uniform distribution of fine particles wherein the particles have an average particle size 0.3 micron, wherein the uniform distribution is in the form of a substantially cluster-free product. By cluster free is meant no more than 2 particles attached to one another as viewed at a magnification of 500X.

The product by process in accordance with the present invention formed by mixing a molten metal of a liquid titanium with a low liquidus temperature salt containing fine carbon particles or dissolved carbon. Both components are brought to reactive contact in the liquid state and thoroughly mixed. After reaction of carbon with liquid titanium, the salt is decanted or removed. The melt which contains uniformly distributed, finely

sized, unagglomerated carbide particles is cast into a mold or cast to form ingot.

Applicants' Figure 1 illustrates a section of casting in microstructure by actual photomicrograph to show ceramic second phase particles in metal as produced by conventional processes available in the prior art. Large size particles in uneven dispersion are apparent.

In Applicants' Figure 2, a section is shown of the uniformly dispersed, finely sized titanium carbide particles formed in situ in aluminum in accordance with the product by process of the present invention. The dispersoid particles are observed in microstructure to be finely sized with an average particle diameter less than about 0.3 microns and can be seen to be uniformly dispersed throughout the metal.

Applicants have found empirically that the present invention produces uniformly dispersed, finely sized ceramic phase particles formed and dispersed in-situ in a metal matrix. It has been found further that the present invention produces uniformly dispersed, finely sized ceramic phase particles formed and dispersed in-situ in a metal matrix in a process requiring reaction times shorter than existing conventional approaches, e.g., on the order of less than about one hour. The uniformly

dispersed, finely sized ceramic phase particles dispersed in-situ in a metal matrix are suitable for applications for recrystallization control, dispersion strengthening, and grain refining. Applicants have found that the novel ceramic dispersoid in metal product of the present invention provides a uniformly dispersed product of finely sized ceramic phase particles dispersed in-situ in a metal matrix having a uniform cluster-free distribution of no more than two particles attached to one another at a magnification of 500X. Applicants' invention as claimed provides finely sized titanium carbide particles having an average particle diameter of less than about 0.3 micron formed and dispersed in situ in the final aluminum metal matrix. The present invention provides these unique ceramic phase titanium carbide particles formed and dispersed in situ in the final aluminum metal matrix, which are nowhere taught or suggested in Moshier which is completely different in teaching the use of powders to produce a porous composite material.

For the foregoing reasons, the rejection of Claims 25-41 under 35 U.S.C. 103(a) as unpatentable over Moshier et al. U.S. Patent No. 4,917,964 is based on an insufficient reference and is respectfully requested to be withdrawn.

The prior art made of record and not relied upon has been considered but is not believed to be the basis for rejection of Applicants' Claims.

Reconsideration of this application is requested.

Respectfully submitted,

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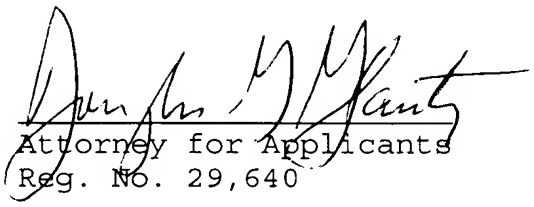

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